

WHAT IS CLAIMED IS:

- 1 1. A method for determining user profile information for a user, the method
2 comprising:
 - 3 a) determining initial user profile information for the user;
 - 4 b) inferring user profile information for the user; and
 - 5 c) determining the user profile information for the user using both the
6 initial user profile information and the inferred user profile information.
- 1 2. The method of claim 1 wherein the act of determining an initial user profile
2 information for the user uses past search queries submitted by the user.
- 1 3. The method of claim 1 wherein the act of determining an initial user profile
2 information for the user uses past document selections by the user.
- 1 4. The method of claim 1 wherein the act of determining initial user profile
2 information for the user uses (i) past search queries submitted by the user, and
3 (ii) past document selections by the user.
- 1 5. The method of claim 1 wherein the initial user profile includes a plurality of
2 attributes, each of the plurality of attributes having a value and a score.
- 1 6. The method of claim 5 wherein the score indicates a likelihood that the value
2 of the attribute is correct.
- 1 7. The method of claim 1 wherein the act of inferring user profile information for
2 the user includes
 - 3 i) defining a node for each of a number of documents and the user,
 - 4 ii) adding edges between nodes if there is an association between
5 the nodes to define a graph, and

6 iii) inferring user profile information for the user using a topology of
7 the graph and user profile information of other documents.

1 8. The method of claim 7 wherein an edge is added between first and second
2 nodes if a document corresponding to the first node was returned in a search
3 results page to a search query from the user corresponding to the second node.

1 9. The method of claim 7 wherein an edge is added between first and second
2 nodes if a document corresponding to the first node was selected by the user
3 corresponding to the second node.

1 10. The method of claim 7 wherein an edge is added between first and second
2 nodes if a document corresponding to the first node is linked with a document
3 corresponding to the second node.

1 11. The method of claim 7 wherein an edge is added between first and second
2 nodes if a document corresponding to the first node was visited by a set of users
3 that have visited another document corresponding to the second node.

1 12. The method of claim 7 wherein an edge is added between first and second
2 nodes if a user corresponding to the first node visited a set of one or more
3 documents also visited by another user corresponding to the second node.

1 13. The method of claim 7 wherein the act of inferring user profile information for
2 the user using a topology of the graph includes

- 3 i) multiplying the initial user profile information of the user by a first value
4 to generate a first product;
5 ii) multiplying user profile information of neighboring graph nodes by a
6 second value to generate a second product; and
7 iii) adding the first product and the second product.

1 14. A method for determining user profile information for a document, the
2 method comprising:
3 a) determining initial user profile information for the document;
4 b) inferring user profile information for the document; and
5 c) determining the user profile information for the document using both
6 the initial user profile information and the inferred user profile information.

1 15. The method of claim 14 wherein the act of determining an initial user profile
2 information for the document uses content information from the document.

1 16. The method of claim 14 wherein the act of determining initial user profile
2 information for the document uses document meta information.

1 17. The method of claim 14 wherein the act of determining initial user profile
2 information for the document uses (i) content information from the document, and
3 (ii) document meta information.

1 18. The method of claim 14 wherein the initial user profile information includes a
2 plurality of attributes, each of the plurality of attributes having a value and a
3 score.

1 19. The method of claim 18 wherein the score indicates a likelihood that the
2 value of the attribute is correct.

1 20. The method of claim 14 wherein the act of inferring user profile information
2 for the document includes
3 i) defining a node for each of a number of documents and for each
4 of a number of users,
5 ii) adding edges between nodes if there is an association between
6 the nodes to define a graph, and

7 iii) inferring user profile information for the document using a
8 topology of the graph and user profile information of users and of
9 other documents.

1 21. The method of claim 20 wherein an edge is added between first and second
2 nodes if a document corresponding to the first node was returned in a search
3 results page to a search query from the user corresponding to the second node.

1 22. The method of claim 20 wherein an edge is added between first and second
2 nodes if a document corresponding to the first node was selected by the user
3 corresponding to the second node.

1 23. The method of claim 20 wherein an edge is added between first and second
2 nodes if a document corresponding to the first node is linked with a document
3 corresponding to the second node.

1 24. The method of claim 20 wherein an edge is added between first and second
2 nodes if a document corresponding to the first node was visited by a set of users
3 that have visited another document corresponding to the second node.

1 25. The method of claim 20 wherein an edge is added between first and second
2 nodes if a user corresponding to the first node visited a set of one or more
3 documents also visited by another user corresponding to the second node.

1 26. The method of claim 20 wherein the act of inferring user profile information
2 for the document using a topology of the graph includes

- 3 i) multiplying the initial user profile information of the document by a first
4 value to generate a first product;
5 ii) multiplying user profile information of neighboring graph nodes by a
6 second value to generate a second product; and
7 iii) adding the first product and the second product.

1 27. A method for determining a match used for scoring an ad, the method
2 comprising:

- 3 a) determining a first match value using (A) at least one of user profile
4 information of an ad landing page of the ad and user profile information
5 used for targeting the ad, and (B) user profile information of a user to
6 which the ad will be rendered;
- 7 b) determining a second match value using (A) at least one of user profile
8 information of an ad landing page of the ad and user profile information
9 used for targeting the ad, and (B) user profile information of a document
10 with which the ad will be served; and
- 11 c) determining the match used for scoring the ad using the first match
12 value and the second match value.

1 28. The method of claim 27 wherein at least some of the user profile information
2 of the ad landing page of the ad was inferred.

1 29. The method of claim 27 wherein at least some of the user profile information
2 used for targeting of the ad was inferred.

1 30. The method of claim 27 wherein at least some of the user profile information
2 of the user was inferred.

1 31. The method of claim 27 wherein at least some of the user profile information
2 of the document was inferred.

1 32. The method of claim 27 wherein the user profile information includes
2 - at least one broad attribute selected from a set of broad attributes
3 including (A) a geographic area, (B) a topic, (C) a user age range, (D) a
4 language, and
5 - at least one narrow attribute selected from a set of narrow attributes
6 including (A) words, and (B) phrases.

1 33. Apparatus for determining user profile information for a user, the apparatus
2 comprising:

- 3 a) means for determining initial user profile information for the user;
- 4 b) means for inferring user profile information for the user; and
- 5 c) means for determining the user profile information for the user using
- 6 both the initial user profile information and the inferred user profile
- 7 information.

1 34. The apparatus of claim 33 wherein the means for determining an initial user
2 profile information for the user use past search queries submitted by the user.

1 35. The apparatus of claim 33 wherein the means for determining an initial user
2 profile information for the user use past document selections by the user.

1 36. The apparatus of claim 33 wherein the means for determining initial user
2 profile information for the user use (i) past search queries submitted by the user,
3 and (ii) past document selections by the user.

1 37. The apparatus of claim 33 wherein the initial user profile includes a plurality
2 of attributes, each of the plurality of attributes having a value and a score.

1 38. The apparatus of claim 37 wherein the score indicates a likelihood that the
2 value of the attribute is correct.

1 39. The apparatus of claim 37 wherein the means for inferring user profile
2 information for the user include means for
3 i) defining a node for each of a number of documents and the user,
4 ii) adding edges between nodes if there is an association between
5 the nodes to define a graph, and
6 iii) inferring user profile information for the user using a topology of
7 the graph and user profile information of other documents.

1 40. The apparatus of claim 39 wherein the means for adding edges adds an
2 edge between first and second nodes if a document corresponding to the first
3 node was returned in a search results page to a search query from the user
4 corresponding to the second node.

1 41. The apparatus of claim 39 wherein the means for adding edges adds an
2 edge between first and second nodes if a document corresponding to the first
3 node was selected by the user corresponding to the second node.

1 42. The apparatus of claim 39 wherein the means for adding edges adds an
2 edge between first and second nodes if a document corresponding to the first
3 node is linked with a document corresponding to the second node.

1 43. The apparatus of claim 39 wherein the means for adding edges adds an
2 edge between first and second nodes if a document corresponding to the first
3 node was visited by a set of users that have visited another document
4 corresponding to the second node.

1 44. The apparatus of claim 39 wherein the means for adding edges adds an
2 edge between first and second nodes if a user corresponding to the first node
3 visited a set of one or more documents also visited by another user
4 corresponding to the second node.

1 45. The apparatus of claim 39 wherein the means for inferring user profile
2 information for the user using a topology of the graph include means for
3 i) multiplying the initial user profile information of the user by a first value
4 to generate a first product;
5 ii) multiplying user profile information of neighboring graph nodes by a
6 second value to generate a second product; and
7 iii) adding the first product and the second product.

1 46. Apparatus for determining user profile information for a document, the
2 apparatus comprising:
3 a) means for determining initial user profile information for the document;
4 b) means for inferring user profile information for the document; and
5 c) means for determining the user profile information for the document
6 using both the initial user profile information and the inferred user profile
7 information.

1 47. The apparatus of claim 46 wherein the means for determining an initial user
2 profile information for the document use content information from the document.

1 48. The apparatus of claim 46 wherein the means for determining initial user
2 profile information for the document use document meta information.

1 49. The apparatus of claim 46 wherein the means for determining initial user
2 profile information for the document use (i) content information from the
3 document, and (ii) document meta information.

1 50. The apparatus of claim 46 wherein the initial user profile information includes
2 a plurality of attributes, each of the plurality of attributes having a value and a
3 score.

1 51. The apparatus of claim 50 wherein the score indicates a likelihood that the
2 value of the attribute is correct.

1 52. The apparatus of claim 46 wherein the means for inferring user profile
2 information for the document include means for
3 i) defining a node for each of a number of documents and for each
4 of a number of users,
5 ii) adding edges between nodes if there is an association between
6 the nodes to define a graph, and

7 iii) inferring user profile information for the document using a
8 topology of the graph and user profile information of users and of
9 other documents.

1 53. The apparatus of claim 52 wherein the means for adding edges adds an
2 edge between first and second nodes if a document corresponding to the first
3 node was returned in a search results page to a search query from the user
4 corresponding to the second node.

1 54. The apparatus of claim 52 wherein the means for adding edges adds an
2 edge between first and second nodes if a document corresponding to the first
3 node was selected by the user corresponding to the second node.

1 55. The apparatus of claim 52 wherein the means for adding edges adds an
2 edge between first and second nodes if a document corresponding to the first
3 node is linked with a document corresponding to the second node.

1 56. The apparatus of claim 52 wherein the means for adding edges adds an
2 edge between first and second nodes if a document corresponding to the first
3 node was visited by a set of users that have visited another document
4 corresponding to the second node.

1 57. The apparatus of claim 52 wherein the means for adding edges adds an
2 edge between first and second nodes if a user corresponding to the first node
3 visited a set of one or more documents also visited by another user
4 corresponding to the second node.

1 58. The apparatus of claim 52 wherein the means for inferring user profile
2 information for the document using a topology of the graph include means for
3 i) multiplying the initial user profile information of the document by a first
4 value to generate a first product;

- 5 ii) multiplying user profile information of neighboring graph nodes by a
- 6 second value to generate a second product; and
- 7 iii) adding the first product and the second product.

1 59. Apparatus for determining a match used for scoring an ad, the apparatus
2 comprising:

- 3 a) means for determining a first match value using (A) at least one of user
- 4 profile information of an ad landing page of the ad and user profile
- 5 information used for targeting the ad, and (B) user profile information of a
- 6 user to which the ad will be rendered;
- 7 b) means for determining a second match value using (A) at least one of
- 8 user profile information of an ad landing page of the ad and user profile
- 9 information used for targeting the ad, and (B) user profile information of a
- 10 document with which the ad will be served; and
- 11 c) means for determining the match used for scoring the ad using the first
- 12 match value and the second match value.

1 60. The apparatus of claim 59 wherein at least some of the user profile
2 information of the ad landing page of the ad was inferred.

1 61. The apparatus of claim 59 wherein at least some of the user profile
2 information used for targeting of the ad was inferred.

1 62. The apparatus of claim 59 wherein at least some of the user profile
2 information of the user was inferred.

1 63. The apparatus of claim 59 wherein at least some of the user profile
2 information of the document was inferred.

1 64. The apparatus of claim 59 wherein the user profile information includes

- 2 - at least one broad attribute selected from a set of broad attributes
- 3 including (A) a geographic area, (B) a topic, (C) a user age range, (D) a
- 4 language, and
- 5 - at least one narrow attribute selected from a set of narrow attributes
- 6 including (A) words, and (B) phrases.